CLAIMS:

We claim the following:

1. An electrical stimulator system for augmenting recovery from muscle denervation, the electrical stimulator system comprising:

a first electrode adjacent a proximal stump of a nerve and for emitting a signal having at least one variable parameter;

a second electrode providing a return path for the signal;

an electronic assembly for generating the signal;

the first electrode, the second electrode, and the electronic assembly being positioned within the body; and

said signal propagating through electrically conductive tissues of the body and evoking an action potential in at least one motor axon, the motor axon regenerating from the proximal stump, so as to augment recovery from muscle denervation.

2. The electrical stimulator system according to claim 1, wherein one of the electrodes stores energy by capacitive means.

3. The electrical stimulator system according to claim 1 further comprising:

an electronic programmer for programming variable parameters;

a controller having an input connected to the output of the electronic programmer, and supplying a command signal at its output to an inductive coupling; and

said at least one of the variable parameters being included in the command signal.

4. The electrical stimulator system according to claim 1, wherein the signal is a current.

5. The electrical stimulator system according to claim 2, wherein the first electrode is a tantalum capacitor electrode.

6. The electrical stimulator system according to claim 1, wherein the second electrode is made of iridium.

7. The electrical stimulator system according to claim 1, wherein the second electrode maintains a neutral polarization relative to the first electrode.

8. The electrical stimulator system according to claim 3, wherein the inductive coupling applies a radio frequency field to the electronic assembly.

9. The electrical stimulator system according to claim 4, further comprising a flexible dielectric membrane as a sheath to confine the current more closely with the nerve.

10. The electrical stimulator system according to claim 1, wherein said at least one variable parameter being at least one of intensity, duration, shape, and temporal pattern.

11. The electrical stimulator system according to claim 1, including a capacitor in series with the electrodes for the purpose of preventing net direct current flow through the electrodes and tissues.

12. The method or treatment of injuries to peripheral nerves to provide recovery from muscle denervation employing the stimulator system according to claim 1, further comprising the step of recording and quantifying an electromyogram and contractile forces produced by the muscle in response to the action potentials.

13. The method or treatment of injuries to peripheral nerves to augment recovery from muscle denervation employing the stimulator system according to claim 1, further comprising the step of applying current so as to create potential gradients in the peripheral nerve sufficient to enhance the outgrowth of neurites.

14. An electrical stimulator system for augmenting recovery from muscle denervation, the electrical stimulator system comprising:

a first electrode adjacent a proximal stump of a nerve and generating a signal having at least one variable parameter;

a second electrode for receiving the signal;

an electronic assembly for storing energy in a capacitance, said energy being a source for the signal;

the first electrode, the second electrode, and the electronic assembly being positioned within the body;

said signal propagating through electrically conductive tissues in the body and evoking an action potential in at least one motor axon, the motor axon regenerating from the proximal stump, so as to augment recovery from muscle denervation.

15. The electrical stimulator system according to claim 14 further comprising:

an electronic programmer for programming variable parameters;

a controller having an input connected to an output of the electronic programmer, and supplying a command signal at its output to an inductive coupling; and

said at least one of the variable parameters being included in the command signal.

16. The electrical stimulator system according to claim 14, wherein the signal is a current.

17. The electrical stimulator system according to claim 14, wherein the second electrode is made of iridium.

18. The electrical stimulator system according to claim 14, wherein the second electrode maintains a neutral polarization relative to the first electrode.

19. The electrical stimulator system according to claim 15, wherein the inductive coupling applies a radio frequency field to the electronic assembly.

20. The electrical stimulator system according to claim 14, wherein the electronic sensor is positioned within the body.

21. The electrical stimulator system according to claim 16, further comprising a flexible dielectric membrane as a sheath to confine the current more closely with the nerve.

22. The electrical stimulator system according to claim 14, wherein said at least one variable parameter being at least one of intensity, period, duration, shape, and temporal pattern.

23. A system for treatment of a surgically repaired peripheral nerve to augment recovery from muscle denervation, the system comprising:

an electronic device implanted in the body in the vicinity of the peripheral nerve, said electronic device producing electrical currents in the body that flow in part through the peripheral nerve; and

an electronic controller located outside the body for controlling the strength, duration and temporal patterning of said electrical currents.

24 A method for treatment of injuries to peripheral nerves to augment recovery from muscle denervation, the method comprising the step of:

applying a train of stimulating pulses through a first electrode positioned in the body at a predetermined intensity to evoke action potentials in at least one motor axon in a proximal stump; the pulses being applied at a time period after effecting nerve repair.

25. A method as claimed in claim 24 including

supplying a brief and high intensity stimulating pulse by discharging a capacitance in the first electrode.

26. A method as claimed in claim 24 wherein the time period is between about 1 hour and 24 hours.

27. The method or treatment of injuries to peripheral nerves to provide recovery from muscle denervation according to claim 24, further comprising the step of recording and quantifying an electromyogram and contractile forces produced by the muscle.

28. The method or treatment of injuries to peripheral nerves to provide recovery from muscle denervation according to claim 24, further comprising the step of increasing the stimulation pulse intensity to elicit action potentials in distal motor axons.

29. A method for determining the state of recovery from a peripheral nerve injury, the method comprising the steps of:

applying a train of stimulating pulses from an implanted device at a predetermined intensity to evoke action potentials in at least one motor axon in a proximal stump;

and

effecting at least one of recording or quantifying at least one of an electromyogram or contractile forces produced by the muscle.

30. A method for treatment of injuries to peripheral nerves to augment recovery from muscle denervation, the method comprising the step of:

applying a non-pulsatile electrical field by means of a fully implanted device, the field being applied for a sufficient length of time after effecting nerve repair.

31. The method as claimed in claim 30 wherein a capacitor is used to prevent net direct current flow and said capacitor is discharged intermittently for resetting purposes.

32. A system for treatment of a surgically repaired peripheral nerve to augment recovery from muscle denervation, the system comprising:

an electronic device implanted in the body in the vicinity of the peripheral nerve, said electronic device producing electrical currents that flow in part through the peripheral nerve thereby to augment regeneration and recovery of neuromuscular function.